"Understanding" Questions

Respondents saw a brief explanation of advanced technology vehicles (hybrid electric vehicles, electric vehicles, extended range electric vehicles, and plug-in hybrid electric vehicles). They were then told:

> To help consumers decide whether advanced technology vehicles might be good choices for them, the fuel economy label is being revised. These revisions will allow you to compare more accurately among all vehicle technologies. Your answers to the following questions will help this label redesign effort.
>
> The next 6 questions ask you to look at the labels from two vehicles. YOU SHOULD ASSUME THAT ANY PLUG-IN VEHICLES START FULLY CHARGED AND THERE ARE NO RECHARGING OPPORTUNITIES DURING THE SPECIFIED TRIP.

Respondents then saw 3 pairs of labels and answered 2 questions about each pair: "Which vehicle is better for a round-trip of XX miles?" (The number of miles varied in each question.) Each respondent saw only one of the three label designs in the NPRM.

The respondent was asked which vehicle was "better," rather than which was more fuel-efficient or less expensive, to leave the respondent with the maximum discretion over which label features ~~were~~ would help answer the question. Because of this discretion, respondents could answer based on factors unrelated to fuel economy or cost. For instance, some respondents might be reluctant to choose an advanced-technology vehicle under any circumstances. Nevertheless, the responses were coded as being "correct" or "incorrect, with the "correct" answer being the most cost-effective vehicle for the length of the trip.[1] Because respondents were not directed to look at any specific label elements, the absolute number of "correct" answers may not be a good measure of the labels. Because these idiosyncratic responses are expected to be randomized over the labels, the differences in responses to the questions are expected to be due to the label designs.

The regression results are presented in ****. The results are provided separately for each question. In addition, a summary regression pools all the responses. In all cases, the dependent variable ~~being~~ is whether the question was answered "correctly." Those who responded that "both vehicles are equally good" were included in the "incorrect" responses. The regression results are all relative to the results for Label 3, which is used as the baseline here.

The results generally show that seeing Label 2 increased the likelihood of someone answering correctly by about 26%, and seeing Label 1 decreased the likelihood of someone answering correctly by about 11%, compared to seeing Label 3. This result is not uniform in all regressions. For instance, seeing Label 2 significantly *decreases* the likelihood of correctly choosing the electric vehicle for a short trip compared to a gasoline vehicle in Question 9. In

[1] For these fuels, the most cost-effective is also the most energy-efficient and has the lowest tailpipe greenhouse gases, because electricity is less expensive per mile and has zero tailpipe emissions. Range was also a critical factor for evaluating the most cost-effective vehicle for the specified trip.

addition, in four out of 6 of the regressions, the responses to Label 1 are statistically no different than the responses to Label 3.

Explanatory variables that tended to *increase* the likelihood of choosing correctly include:
- Fewer than 5 licensed drivers in the household
- Being male
- Not being the fastest adopter of new technology

Explanatory variables that tend to *reduce* the likelihood of choosing correctly include:
- Less education
- Fewer than 5 household vehicles

These results, with the exception of "Male," are inconsistent across the regression results.

"Influence" Questions

To test the potential influence of the labels on vehicle purchases, respondents saw pairs of labels for vehicles and were asked:

> Assuming the same make and model of vehicle for both labels on the left and assuming that both vehicles met all your other requirements (including size, reliability, comfort, performance, appearance, and safety) and are identical in purchase price, which vehicle would you purchase when you consider your typical travel pattern?

These questions are best viewed individually, because the choices of vehicles are not directly comparable. Which vehicle a respondent is likely to select will vary based on that person's driving patterns as well as any idiosyncratic attitudes about the vehicles.

Pair #1

- Vehicle A: Gasoline, 46 mpg, $913 annual fuel cost, A- grade
- Vehicle B: Extended-range electric vehicle (EREV), A- grade:
  - all-electric: range 20 miles, 98 mpge, $618 annual fuel cost
  - Extended range: 28 mpg, $1,500 annual fuel cost

EREV is less expensive for shorter distances between charges; gasoline vehicle is less expensive for longer distances

Results are shown in ***. Seeing Label 1 increased the likelihood that the respondent would choose the gasoline vehicle, compared to seeing Label 3. Responses to Label 2 did not differ statistically from responses to Label 3.

Driving less than 20 miles on a typical day statistically increased the likelihood of choosing the EREV. This result suggests some understanding of the new technology: the EREV is less expensive when it runs purely on electricity (range stated on the label was 20 miles), but it is more expensive than the gasoline vehicle for longer distances.

A larger share of city driving also increased the likelihood of choosing the EREV.

Being slow to adopt new technologies shows some indication of increasing the choice of a gasoline vehicle. This result is not surprising: EREVs, a new technology, are expected to be chosen more by early adopters than by those slower to new technologies.

Pair #2

- Vehicle A: Gasoline, 28 mpg, $1,500 annual fuel cost, B grade
- Vehicle B: Electric vehicle (EV), range 85 miles, 123 mpge, $490 annual fuel cost, A+ grade

EV is better for shorter distances, but has limited range between charges; gasoline vehicle is better for longer distances

People who saw Label 2 were more likely to choose the gasoline vehicle than those who saw either Label 1 or Label 3. Responses to Label 1 were not statistically distinguishable from responses to Label 3.

The likelihood of selecting the gasoline vehicle is higher for: people over age 65; men; and those who considered buying a crossover vehicle.

The likelihood of selecting the EV is higher for: those who drive less than 80 miles on a daily basis; and those who rank the fuel economy label very highly in their decision process.

Pair #3

- Vehicle A: Extended-range electric vehicle (EREV), A grade:
  - all-electric: range 32 miles, 89 mpge, $679 annual fuel cost
  - extended range: 31 mpg, $1,355 annual fuel cost
- Vehicle B: Electric vehicle (EV), range 80 miles, 121 mpge, $501 annual fuel cost, A+ grade

EREV is better for longer distances; EV is better for shorter distances, but has limited range between charges

People who saw Label 2 were more likely than people who saw Label 1 or Label 3 to select the EREV over the EV. Responses to Label 1 were not statistically distinguishable from responses to Label 3.

The likelihood of selecting the EREV is higher for: men; those who considered buying crossover vehicles.

The likelihood of selecting the EV is higher for: people below age 45; those with 1 or 2 vehicles in their household; those who drive less than 70 miles per day.

Pair #4

- Vehicle A: Extended-range electric vehicle (EREV), A grade:
  - all-electric: range 30 miles, 90 mpge, $672 annual fuel cost
  - Extended range: 32 mpg, $1,313 annual fuel cost
- Vehicle B: Plug-in hybrid electric (PHEV), A grade:
  - blended: range 30 miles, 65 mpge, $734 annual fuel cost

- Extended range: 54 mpg, $778 annual fuel cost

EREV is better for shorter distances; PHEV is better for longer distances

More people selected the PHEV (59%) than the EREV (24%), with 17% indifferent between the two vehicles. None of the labels performed statistically differently than the others in selection, although (see "understanding" questions 10 and 11) Label 2 appears to have contributed to more "correct" answers about the differences between these vehicles.

A higher proportion of city miles is associated with choosing the EREV, although daily miles driven shows no statistical association with the choice. No other explanatory variables are found to have statistically significant explanatory power.

Overall assessment of the "Influence" questions

The fact that daily driving patterns influenced the choices of electric vehicles in the "correct" direction indicates that people did think about at least this topic in their selections.

The role of the labels in people's selections suggests but does not prove some patterns. In questions 16 and 17, people who saw Label 1 or 3 had higher probabilities of choosing the EV (over either a gasoline vehicle or an EREV) than people who saw Label 2. In question 15, people who saw Label 1 were more likely than people who saw Labels 2 or 3 to choose the quite efficient gasoline vehicle over the EREV (which had the same letter grade but lower 5-year fuel savings than the gasoline vehicle). These observations suggest but do not prove that Label 1 may make fuel savings a more salient metric than Label 2.